Chris-Craft®

4/23/86

Dear Tom,

Enclosed is the disc I said I would send you. On it is the Auto program that I mentioned on the phone. The routine I thought about extracting from it for publication is the Gear Ratio & MPH.

Other programs on the disc are:

Boot.bas - Auto program
Edcon.scr
High.bas
Perf.bin

Chars.bas - Character set routine
Set.bin

Labels.bas - Makes cassette labels on the 2040

Tasword.bas - Tasword II with XFER
xfer.bin
word.bin

The character routine is a much expanded version of the program written by Roger VAlentine, in his book The Timex Sinclair 2068, What can YOU do with it.

When moving the basic area to 32768, I was left with roughly 6K below that area for mc storage. Instead of resetting the pointers used by basic, I just did an LDIR of the system variables to 27000 (for home bank) and 29000 (for dock bank) and then reload them at the appropriate time. With the experimentation I've done so far there has been no problem finding variables. I did it useing 2 different length basics .

Thanks for the input on the newsletter.

Sincerely,

Dave

Dave Hill

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INTRODUCTION

This program was written with the automotive enthusiast in mind. Being a certified mechanic and a "GEAR HEAD", I read most of the popular high performance magazines on the market. Over the last 15 years of reading, there have been numerous formulas for computing gear ratios, etc. I needed some way to easily make use of these. This need resulted in this program. I hope you find it as useful as I do.

A. COIL SPRINGS

Upon choosing "A" from the menu, the table will be printed on the screen. You will be asked if you wish to enter NEW DATA "N", or CONTINUE "C" with the existing information.

For now press "C" to continue. The next prompt will ask which item you would like to change, the spring LENGTH "L" or the spring RATE "R". If you chose "L", for LENGTH, you will then be asked if you want to change the length BEFORE of AFTER cutting ("A" or "B").

After you have made your choice, type the new length and press ENTER. The new rate after cutting will be printed in the right hand column of the table.

If you chose "R", for RATE BEFORE CUTTING, type in the new spring rate and press ENTER.

The most recent entry in the table will always be printed in blue paper with white ink. Starting from the top.

Continue entering different combinations as your needs require. The table will hold 12 lines. When full, you will still be asked to make a selection. Type in your new data. Then, after pressing ENTER, the table will clear and place the latest entry at the top in blue and white.

Pressing "V" when the prompt appears will clear the table of data and place the most recent entry at the top.

Pressing "C" when the prompt appears will copy the screen to the printer.

Pressing "M" when the prompt appears will return you to the main menu.

The lowering of a vehicle is a common way to increase it's handling ability. There is more than one way to this end. One way of achieving this is to use a cutting torch to heat up the spring. While this will lower the ride height of the car, it also releases some of the tension in the spring, (allowing it to bottom out sooner). This method produces unpredictable results and therefore is not recommended.

A better method is to remove the spring from the car and cut it using an abrasive cutting wheel. A large bench grinder or a body saw will do the job. Also, the use of a torch here to cut the springs will not produce consistent results. Be sure to grind the freshly cut end of the spring before installing. This will prevent it from cutting into the spring pocket.

Springs are rated in foot pounds per square inch. This is the amount of pressure (foot pounds) required to compress the spring 1". Factors such as the wire diameter also effect the rate.

Cutting the coils to lower a car, effectively increases the spring rate. To properly determine the amount of rate increase, use a tape measure to find the overall wire length of the spring before and after cutting.

B. BOLT TORQUE SPECIFICATIONS

Pressing "B", for BOLT TORQUE SPECIFICATIONS, will present you with another menu and a graphic depiction of the markings found on the head of a bolt. At this point you can choose "5", "7", or "8" for the data table, or "C" to COPY and "M" for the main menu. If you chose 5,7,or 8, a table will be printed, listing both WET and DRY specs. When looking at the table you have two command options,"C" to COPY and "M" for the previous menu.

The amount of force applied to a bolt is measured in foot pounds of torque. The automotive industry uses 3 main types of bolts. The strength of these bolts are rated by different grades, 5, 7, and 8. Each increasing in strength. They can be identified by the markings on the head. Each grade bolt has a maximum amount of torque which can be applied to it.

The specs listed in repair manuals should be *STRICTLY* adhered to. Over torqueing a bolt will overstress the metal to the point of stretching or breaking it. Streching a bolt will weaken it and result in a possible break later on, or allow a bearing to spin. None of these are desirable results. Having broken many bolts I can personally atest to this.

Professional engine builders take into consideration two factors when tightening bolts. The torque reading and the amount of stretch the bolt has undergone. The cost of the tools required to properly measure bolt stretch at the time of torquing is quite high. Therefore, most of us use the ever reliable torque wrench. The reading on a torque wrench is measured from the socket end to the pivot point on the handle. The torque reading is a measure of the resistance of the bolt, against the movement of the wrench. Whether a bolt is dry or lubricated will produce different readings. A lubricated bolt will turn easier, producing a lower torque reading while the clamping force the bolt applies remains the same.

C. CARBURETOR CFM REQUIREMENTS

Pressing "C" from the main menu presents you with a familiar data chart. Press "N" for new data or "C" to continue with the old.

Press either "1" to change engine cid or "2" to change maximum expected rpm. Type in your new data, the press ENTER.

Pressing "V" when the prompt appears will clear the table of data and place the most recent entry at the top.

Pressing "C" will copy the screen to the printer.

Pressing "M" will return you to the main menu.

There is one term that comes up frequently in talking about carburetor sizing, "VOLUMETRIC EFFICIENCY". This is a term used to describe how efficiently an engine ingests air/fuel mixtures as measured in cubic feet per minute (cfm). It is a measure (by weight) of how much mixture is in a cylinder a the time of combustion vs. how much would be there if cylinder filling efficiency were 100%.

These figures are determined by using engine cubic inch displacement and the highest expected rpm.

The formulas in this routine assume an average volumetric efficiency of 85% for street engines and 100% for strip engines.

This will give you the amount of air the engine can physically ingest. Carb jetting will still need fine tuning.

D. WEIGHT DISTRIBUTION

Using this routine requires that you obtain the total weight of your vehicle and the front end weight.

The total weight can be found on the regristration or title. To find the weight of the front end, take your car to a large scale and roll just the front wheels onto it.

The purpose of the routine is to determine the weight distribution (in percent) front and rear. The weight at opposite ends of the car affects the amount of oversteer and understeer. Now let's assume you wish to relocate the battery to the trunk of the car and the battery weights 40 lbs. An example of the changes in weight distribution front and rear can be demonstrated in the following manner.

Pressing "D" from the main menu will enter this routine.

Press "C" to continue and proceed to the following.

Press "F" for front end weight. Subtract 40 lbs. from the front end weight of 1500 lbs. Type 1460 and press ENTER. The resulting percentages are FRONT 52% and REAR 48%. Transfering this amount of weight from the front of a heavier car would have less of an effect. This same idea can be used when installing a fiberglass front end on your car. You not only lower total vehicle weight, you also lower front end weight. Lowering vehicle weight is one way to obtain free horsepower and mileage.

If major weight changes are made, changes in the brake proportioning may be needed. Brake proportioning is set at the factory. They take into account such things as total vehicle weight, front and rear weight bias and the ride height.

An adjustable proportioning valve would solve any front or rear premature brake lockup resulting from changes in weight distribution.

Pressing "V" when the prompt appears will clear the table of data and place the most recent entry at the top.

Pressing "C" when the prompt appears will copy the screen to the printer.

Pressing "M" when the prompt appears will return you to the main menu.

E. ENGINE CUBIC INCH DISPLACEMENT

Press "E" from the main menu. Then press "C" to continue at this time for sample data.

Press "1" to change the bore diameter or "2" to change the length of the stroke or "3" to change the number of cylinders.

Type in your new data and then press ENTER.

Pressing "V" when the prompt appears will clear the table of data and place the most recent entry at the top.

Pressing "C" when the prompt appears will copy the screen to the printer.

Pressing "M" when the prompt appears will return you to the main menu.

Due to the rounding of the numbers in this routine there occa-sionally may be an answer that will show 1 cid higher than those published in repair manuals. This will be the exception, not the rule.

Engine displacement is based on three things. Bore diameter, the length of the piston stroke, and the number of cylinders.

Increasing engine cid can be accomplished in two ways. Enlarging the bore diameter or increasing the length of the stroke.

G. GEARING —VS— MILES PER HOUR

Press "G" from the main menu to enter this routine. Until you have become familiar with this routine, press "C" to continue.

When you press "C" to continue, the data chart will be printed on the screen.

1	2	3	4
		TIRE	GEAR
MPH	RPM	DIA.	RATIO
55	2340	25.5	3.25:1

All of the formulas that operate this routine require 3 variables to compute the 4th item. The best way to explain this is to give you a few examples.

Press "1" at the prompt "CHANGE WHICH COLUMN? ". "MPH" will flash on and off. This will be the new variable in the formula that you will enter.

In response to the prompt "APPLY FIRST CHOICE TO COLUMN ?", press "2". The number "2" above RPM will turn to yellow with black ink, while the "RPM" will turn red with white ink. You will then be asked to input the new "MPH". Type 60 and press ENTER. The table data will update in blue paper and white ink.

1	2	3	4
		TIRE	GEAR
MPH	RPM	DIA.	RATIO
60	2550	25.5	3.25:1

What has happened here is that you have increased the MPH, to see what affect it would have on the RPM while leaving the TIRE DIA. and GEAR RATIO the same.

Now try it a different way. Press "4" for GEAR RATIO. GEAR RATIO will now flash. Now press "2" for RPM. The color combination for "2" and "RPM" will now swap. We will be altering the GEAR RARIO to see how it affects the RPM while the MPH and TIRE DIA. remain the same. You will now be prompted to input the new GEAR RATIO. Type in 4.11 and press ENTER.

The table will again update the data, in blue paper with white ink.

1	2	3	4
		TIRE	GEAR
MPH	RPM	DIA.	RATIO
60	3220	25.5	4.11:1

One more example. Now let's say you would like to have the engine turn the same RPM at 60 MPH with 4.11:1 gears as it did with the 3.25:1 gears, thus saving fuel and engine wear. This would require altering the RPM to see it's affect on the TIRE DIAMETER.

Press "2" for RPM. "RPM" will now be flashing. Press "3" for TIRE DIA.. The color combination for the "3" and "TIRE DIA." will now swap. Now in response to the prompt, type in 2550 (this is the rpm at 60 with the 3.25 gears) and press ENTER.

The new "TIRE DIA." will now be updated in the table in blue paper and white ink.

1	2	3	4
MPH	RPM	TIRE DIA.	GEAR RATIO
60	2550	32.24	4.11:1

Throughout this routine, your first choice will make the column headings "MPH", "RPM","TIRE DIA.", or "GEAR RATIO" flash on and off. This will be the item you wish to alter. Your second choice will always swap the paper and ink colors between the column heading and the number above it. This is to distinguish the source (1st choice), from the destination (2nd choice).

If you chose "N" for NEW DATA, you will exit to another screen which will ask for the "LOADED TIRE DIA." and the "GEAR RATIO". Speedometers in most cars are quite inaccurate. There is even a distinct variation between the same makes and models. Most cars don't come equipped with a tachometer. Therefore, I use the tire diameter and the gear ratio as a base from which to obtain the most accurate results. Your local car dealer should able to provide you with gear ratio information.

After you have input the data asked for, you will be asked if the data is correct. Pressing "N" will clear the entries and again ask for input. Pressing "Y" will put you in the data chart. The first two columns (mph,rpm) will be Ø's. Remember, all the formulas in this routine need 3 variables upon which to base the 4th. Now that you have entered 2 of these (gears,tires) the only column choices will be "1" or "2". Press "1", MPH as the item you wish to alter. Then press "2", for RPM as the destination. Then you will be asked to input the new MPH. After doing this and pressing ENTER, you will have input the 3rd variable in the formula on which to figure the RPM.

Pressing "V" when the prompt appears will clear the table of data and place the most recent entry at the top.

Pressing "C" when the prompt appears will COPY the screen to the printer. Pressing "M" when the prompt appears will return you to the main menu.

F. MIXING FUELS

Press "F" from the main menu. Then press either "N" for new data or "C" to continue with the existing information.

Then choose between fuel "A" or fuel "B". Then choose between gallons "G" or octane "O". Type your new data and press ENTER.

A lot of things contribute to the octane requirements of any given engine, such as combustion chamber shape, engine and air/fuel mixture temperature, and spark advance. Finding the minimum acceptable octane requirement for any given engine is largely a matter of trial and error. Also, a lot of things contribute to the final octane rating of a fuel mixture besides the beginning octane ratings of the base fuels.

Assuming the base fuels didn't alter each other's chemistry when mixed, this routine can be used to *APPROXIMATE* the resultant octane.

Pressing "V" when the prompt appears will clear the table of data and place the most recent entry at the top.

Pressing "C" when the prompt appears will COPY the screen to the printer. Pressing "M" when the prompt appears will return you to the main menu.

H. SUSPENSION TUNING

Pressing "H" from the main menu will enter you into this routine. You will see the screen fill with data. The abbreviations in the headings are for COMPONENT TO ADJUSTMENT, FRONT for (F) and REAR for (R). The tire section is best used for fine tuning after the major components have been selected and installed.

Press "C" to copy to the printer.

Press "M" to return to the main menu.

Two terms associated with handling are "Oversteer" and "Understeer". Most front engine cars are prone to understeer due to the weight of the engine over the front wheels. Simply put, "Oversteer" is the tendancy of the back end of the vehicle to swing out, while "Understeer" is the tendancy for the front end to push, or plow. Both can be remedied with the proper weight distribution, tires and wheels, and suspension pieces.

I. PRINT TOTALS FOR THIS SESSION

Press "I" from the main menu and a prompt at the bottom of the screen will ask if you would like to output the totals to the display "D" or to the printer "P". You may want to view the totals on the display first to verify that they contain the information that you desire. If they don't, return to that routine and make the changes needed. If all is ok, simply press "P" at the prompt and all output will go to the printer. After the routine has completed you will be returned to the main menu.

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